SECTION 9

Transmission

INDEX

Part A

9A 8 SPEED TRANSMISSION – DUAL CLUTCH

Part A

8 Speed Transmission – Dual Clutch
Table of Contents

Operation No.	Description	Page No.
9A.1	Specification	9A - 3
9A.2	General Description - Center shift	9A - 4
9A.3	General Description - Side shift	9A - 5
9A.4	Gear Shift Levers - Center shift	9A - 7
9A.5	Gear Shift Levers - Side shift	9A - 8
9A.6	Selector Rails and Forks - Center shift ...	9A - 27
9A.7	Selector Rails and Forks - Side shift ...	9A - 28
9A.8	Epicyclic Unit - Center shift	9A - 29
9A.9	Epicyclic Unit - Center shift	9A - 30
9A.10	Clutch Release Mechanism	9A - 31
9A.11	Main Drive Housing and PTO Pinion Shaft ...	9A - 32
9A.12	PTO Drive Shaft Bearing Housing ...	9A - 34
9A.13	Main Shaft, Counter Shaft and Gears ...	9A - 35
9A.14	Side shift service tool details ...	9A - 38

9A.1 SPECIFICATION

Type	:	Sliding mesh, manual center Shift & manual Side shift
No. of gears forward	:	8
No.of gears reverse	:	2
Epicyclic reduction unit type	:	Normal duty
Reduction	:	4 : 1

Special Tools

SER / 054	:	Tractor splitting stand.
SER / 076	:	Input shaft oil seal replacer.
SER / 075	:	Housing main drive needle bearing remover and replacer.
SER / 036	:	PTO pinion oil seal replacer.
SER / 038	:	Hand press tool
SER / 056	:	Adaptor for multipurpose bearing remover / replacer
SER / 099	:	Oil seal replacer
SER / 087	:	Reverse gear cluster bearing fitter
SER3000007	:	Side shift & high /low service tool

Torque Values

Steering wheel nut	:	35 lbf. ft. (47 Nm)
Cover plate to transmission case	:	60 lbf. ft. (81 Nm)
Shifter fork locking screws	:	32 lbf. ft. (43 Nm)
Epicyclic unit to transmission case	:	35 lbf. ft. (47 Nm)
Inter lock mechanism to transmission case	:	32lbf. ft. (43 Nm)
Housing main drive to transmission case	:	45 lbf. ft. (61 Nm)
Housing front PTO to transmission case	:	45 lbf. ft. (61 Nm)
Engine to transmission case	:	50 – 57 lbf. ft. (68 – 77 Nm)
Transmission case to rear transmission	:	83 lbf. ft. (112 Nm)

9A.2 GENERAL DESCRIPTION - CENTER SHIFT

The main transmission has four forward speeds and one reverse, doubled by an epicyclic reduction unit to give eight forward speeds and two reverse

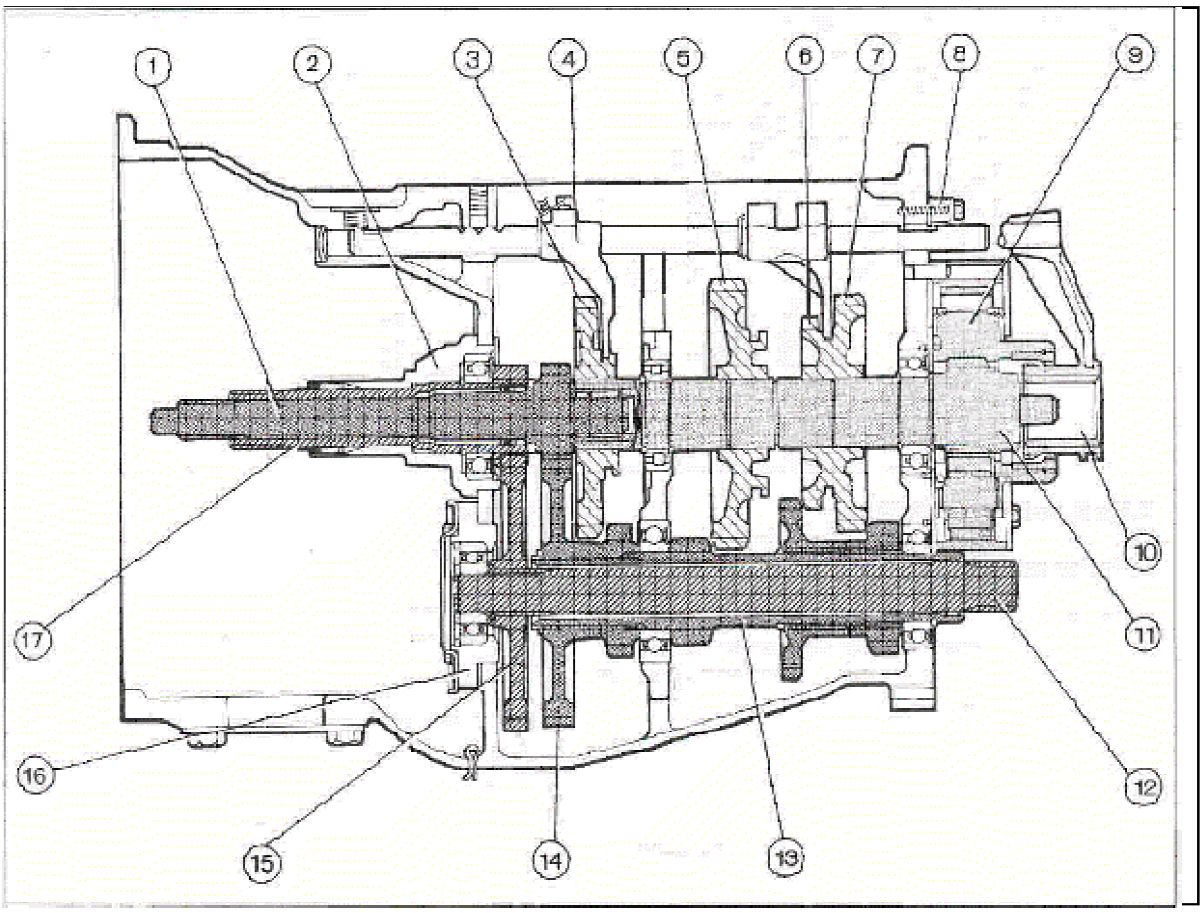


Fig. 1

1. Input shaft
2. Input shaft housing
3. Third gear
4. Selector rails and forks
5. First and reverse gear
6. Fourth gear
7. Second gear
8. Gear shift interlock
9. Epicyclic reduction unit
10. Coupler
11. Mainshaft
12. PTO drive shaft
13. Hollow counter shaft
14. Constant mesh gear
15. Constant mesh gear (PTO)
16. PTO front bearing housing
17. PTO input shaft and gear

9A.3 GENERAL DESCRIPTION - SIDE SHIFT

The main transmission has four forward speeds and one reverse, doubled by an epicyclic reduction unit to give eight forward speeds and two reverse

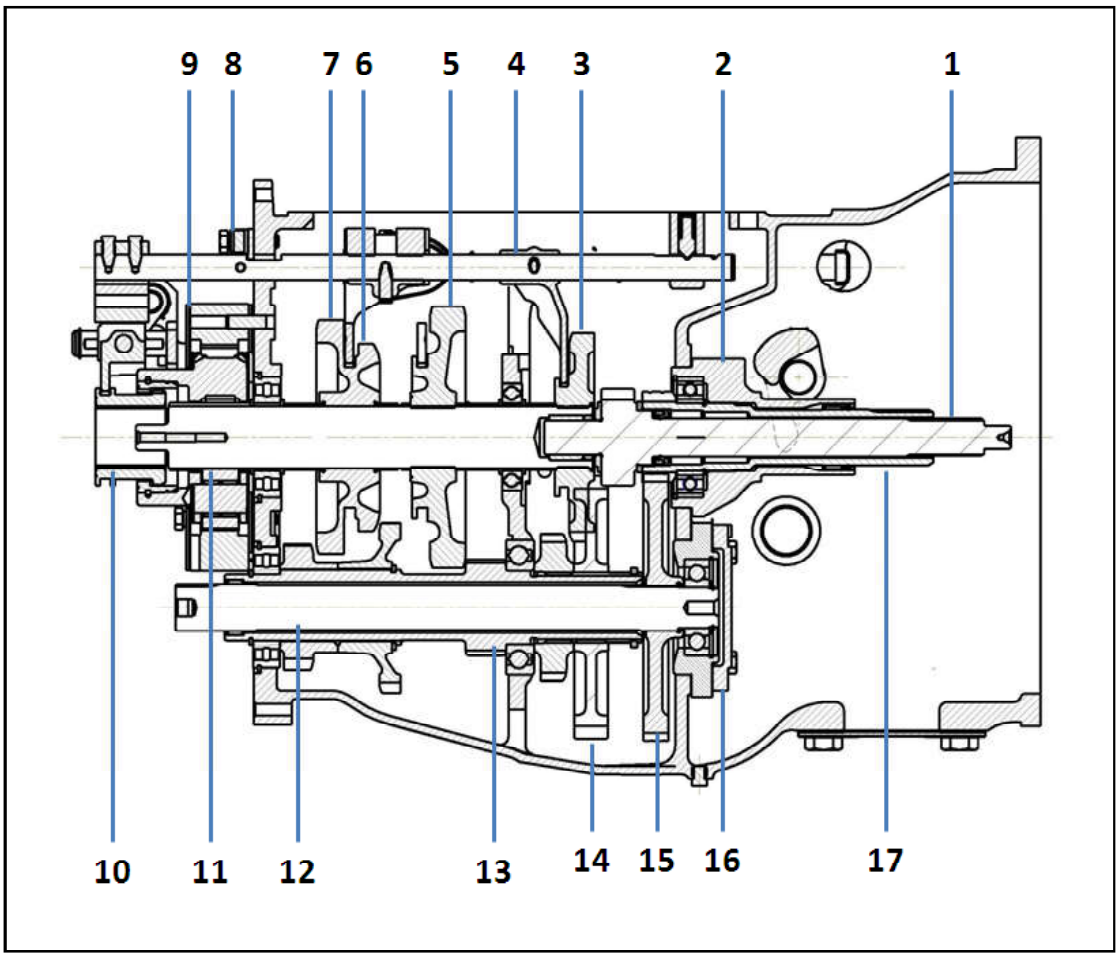


Fig. 2

1. Input shaft
2. Input shaft housing
3. Third gear
4. Selector rails and forks
5. First and reverse gear
6. Fourth gear
7. Second gear
8. Gear shift interlock
9. Epicyclic reduction unit
10. Coupler
11. Mainshaft
12. PTO drive shaft
13. Hollow counter shaft
14. Constant mesh gear
15. Constant mesh gear (PTO)
16. PTO front bearing housing
17. PTO input shaft and gear

Main Transmission Drive

The input shaft is driven by the main transmission clutch plate and drives a pair of constant mesh gears. These, in turn, drive a hollow counter shaft to which are attached the first, second, third and fourth ratio gears. The mainshaft is located above the counter shaft and has mounted on it three sliding gears, one of which is a compound gear having two sets of teeth.

The sliding gears are operated by selector forks mounted on shifter rails which in turn are operated by the gear selector lever located directly above the transmission case.

The sliding gears mesh with the counter shaft gears to give, from the front, third, first, fourth and second gears respectively depending upon the gear selected by the lever.

Epicyclic Reduction Unit

The epicyclic unit consists of a ring gear and three planetary pinions. It is mounted on the rear of the transmission case and driven by the mainshaft splined extension which acts as a sun gear.

To transmit the drive from the main transmission to the rear axle a drive shaft is connected by a coupler, either directly to the gearbox mainshaft (HIGH range) of the planetary pinion carrier where the speed of the gearbox is reduced by 4 : 1 (LOW range). The coupler is operated by a selector fork, rail and gear lever which is mounted alongside the main gear selector lever. As well as selecting either HIGH or LOW range, the lever also has a middle or neutral position which disengages the coupler splines from both the mainshaft and the planetary pinion carrier. In this neutral position an electrical switch completes the starting circuit and the danger of starting in gear is prevented.

Reverse Drive

Reverse drive is achieved by the engagement of a compound gear cluster mounted in the left-hand side of the transmission case. One of the gears is in constant mesh with the fourth gear pinion on the counter shaft. The other gear is engaged by the sliding first gear on the mainshaft. This combination reverses the rotation of the mainshaft, reduction unit and final drive.

PTO Drive Shaft

The PTO input shaft driven by the secondary plate on the dual clutch, rotates a pair of constant mesh gears. These, in turn, drive the PTO shaft which projects rearwards through the hollow counter shaft to drive the hydraulic pump and PTO.

9A.4 GEAR SHIFT LEVERS - CENTER SHIFT

Removal and Refitment

Removal

1. Remove the steering wheel, instrument panel, and other parts necessary to give access to the transmission case top and cover plate assembly.
2. Disconnect hydrostatic pipe lines to hydrostatic steering unit.
3. Remove the hydrostatic steering unit.
4. Remove the bolts securing the top cover assembly to the transmission case.
5. Remove the cover plate assembly from the tractor and place on a work bench.

Main Gear Lever

1. Remove the gear lever knob and nut.
2. Remove the bellow rubber boot and clips.
3. Turn the cover assembly over to facilitate the remove of the spring seat and spring. (Item 1 in Fig. 3)
4. Remove the gear shift lever retaining pin. (Item 4 in Fig. 3)
5. Loosen and remove the ring lock. (Item 3 in Fig. 3)
6. Remove the gear shift lever. (Item 5 in Fig. 3)
7. Tap out the gear shift lever cup. (Item 2 in Fig. 3)

High / low Gear Lever

1. Remove the gear lever knob and nut.
2. Remove the bellow rubber boot and clips.
3. Remove the gear shift lever retaining pin. (Item 3 in Fig. 4)
4. Loosen and remove the ring lock. (Item 2 in Fig. 4)
5. Remove the high/low gear lever. (Item 4 in Fig. 4)
6. Tap out the gear shift lever cup. (Item 1 in Fig. 4)

Refitment

For reassembling, follow the reverse procedures given above, and

1. Replace the bellow rubber covers to prevent water getting into the transmission.
2. Replace the gasket in between transmission and cover plate and torque to 60 lbf. ft. (81 Nm).
3. Replace the steering wheel and tighten the steering wheel nut to torque of 35 lbf. ft. (47 Nm).

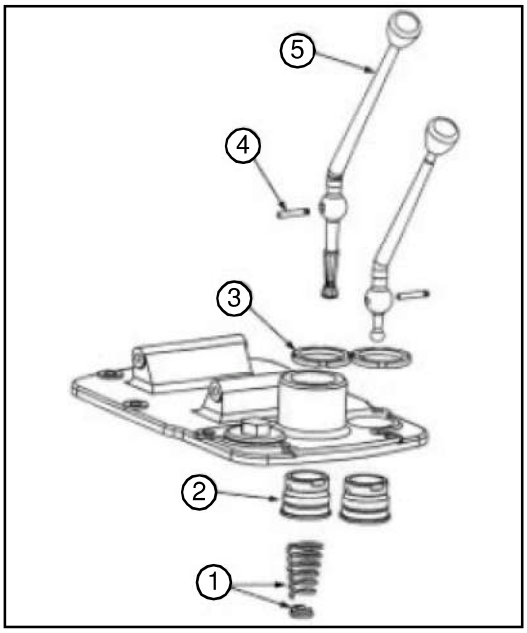


Fig. 3

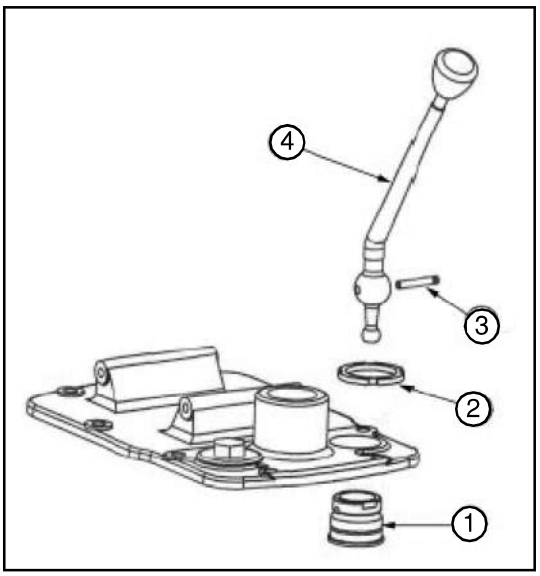


Fig. 4

9A.5 GEAR SHIFT LEVERS - SIDE SHIFT

Removal and refitment

Removal

1. Park the vehicle on level ground and apply parking brake.
2. Pull the hood latch cable and lift the hood.
3. Disconnect the battery terminals
4. Remove the platform from the tractor, see operation 5.16 Foot step (page 5A - 14).
5. Ensure the side shift lever in neutral position.
6. Remove the dipstick
7. Remove 4 bolts, 1 allen head screw and 1 nut in side shift cover
8. Remove M5 nut from side shiftcover
9. Disconnect the response lever by removing a cotter and a clevis pin.
10. Remove the side shift assembly from centre housing.
11. Keep the side shift assembly in suitable fixture.

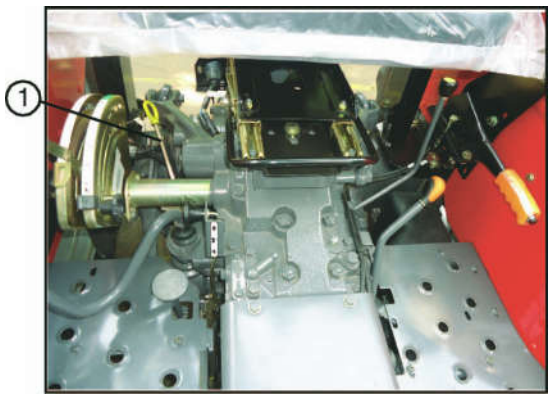


Fig 5

Fig 6

Fig 7

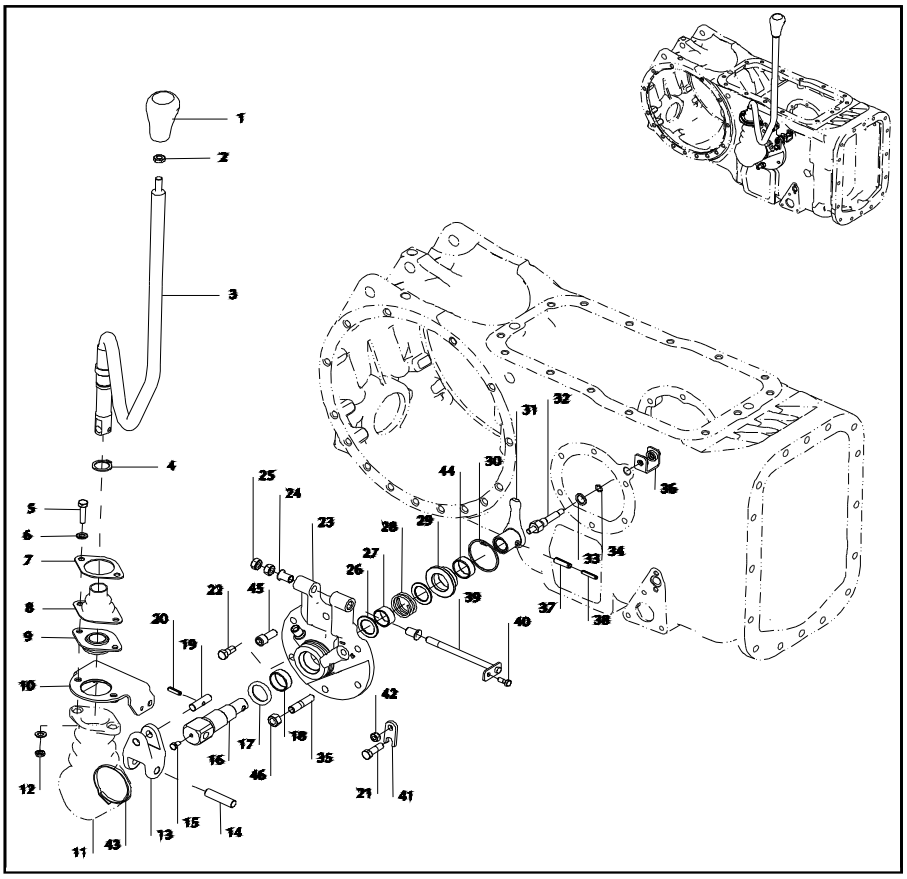


Fig 8

Removal - side shift Gear lever

1. Remove knob(1) and M5 nut(2).

2. Remove the strap(43) and slightly lift the rubber boot(11) for easy accessability.

3. Remove the spring pin(20) and pin (19).

4. Remove the M5 nut(25),M6 bolt(40) and pin assy(39).

5. Remove circlip(4),bolt(5),washer(6),and nut(12).

6. Remove the plate(7),boot(8),assembly ball(9), pivot plate(10) and rubber boot(11).

Removal - side shift housing

7. Remove the M6 bolt(15) and pin (14).

8. Remove the spring pin(38)(37) and selector pawl(31).

9. Remove the shaft(16).

10. Remove the pin (5) and remove the cam (6) and spring (7) - Refer fig: 9.

11. Remove the pin (13) and remove the lever (15), shaft (12) and washer (11) - Refer fig:9.

12. Remove the circlip(30), bush(44) , collar(29), washer(26), spring(28) and spacer(27) .

13. Remove oil seal(17) and bush(18).

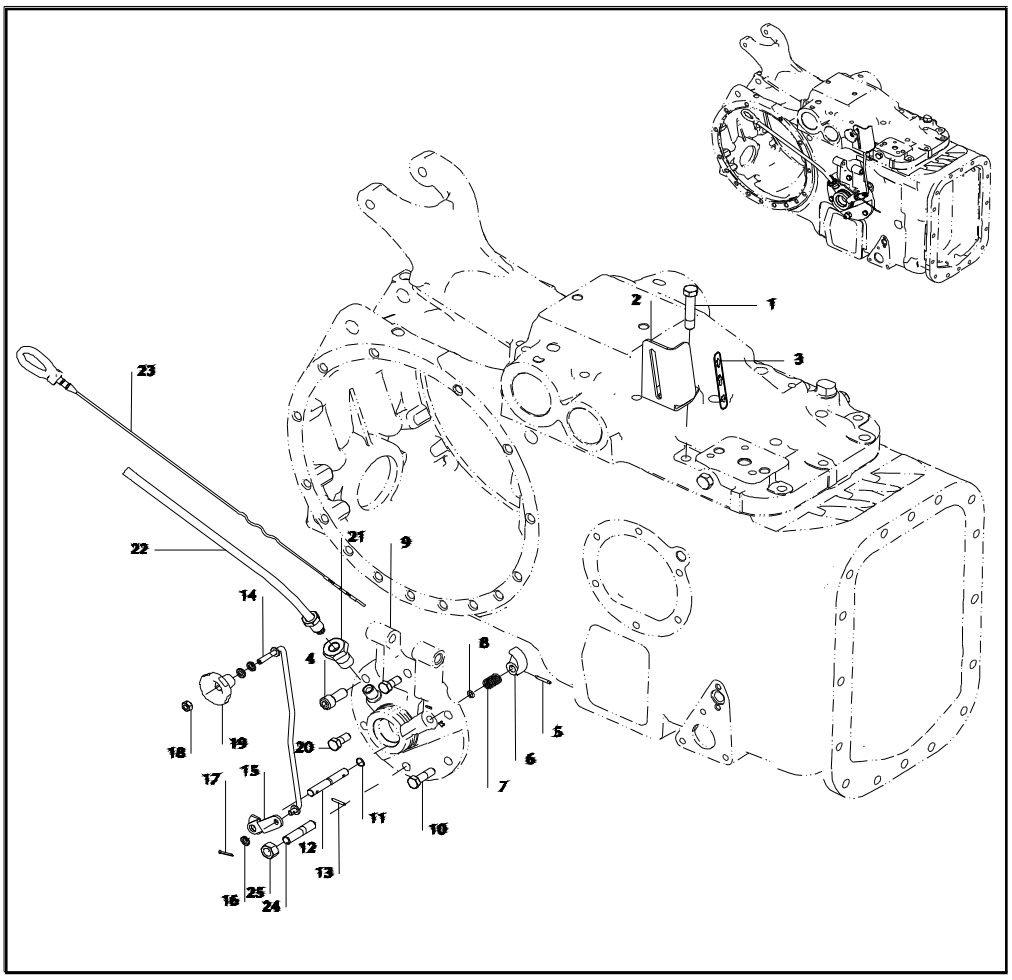


Fig 9

Refitment

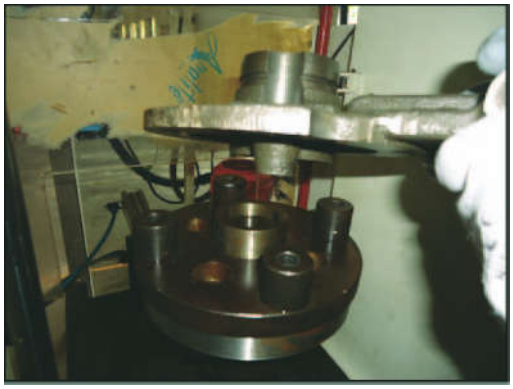
1. Place the collar on the table

2. Place the bush in the service tool (SER3000007) as shown

NOTE : Refer page no:39 for service tool details

3. Press the bush inside the collar using a hand press

4. Place the side cover housing on a suitable work bench as shown



Refitment

5. Place the service tool (SER3000007) on the side cover housing as shown

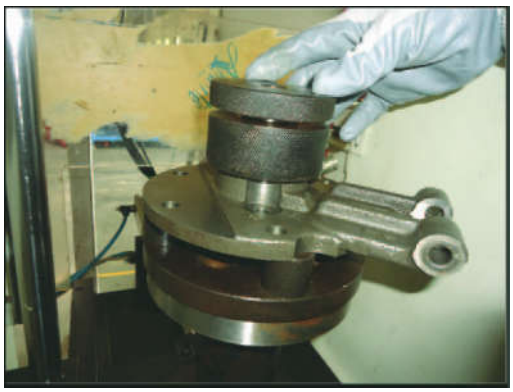
NOTE : Refer page no:39 for service tool details

6. Fix the seal on the service tool (SER3000007)

NOTE: The lip of the seal to be faced up

Refer page no:39 for service tool details

7. Place the seal on the side cover housing and press using a hand press



8. Place the service tool(SER3000007) on the work bench as shown

NOTE : Refer page no:39 for service tool details

Refitment

9. Place the side shift cover housing on the tool

10. Place the spacer inside the side cover housing

11. Place the spring

12. Place the collar

NOTE: The collar to be placed inside the spring

Refitment

13. Assemble the washer over the spring

14. Assemble the bush on the side cover housing and place the service tool (SER3000007) as shown

NOTE : Refer page no:39 for service tool details

15. Press the assembly using a hand press

16. Secure the assembly with circlip

Refitment

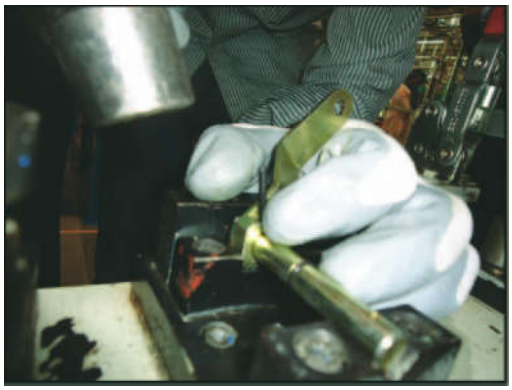
17. Assemble the O ring on the repnse cover shaft

18. Assemble the response cover shaft with response lever

NOTE: Match the holes of response cover shaft and response lever

19. Place the assembly in a suitable vice

20. Secure the responsed cover shaft with response lever using a spirol pin



21. Assemble the ring with the response assembly

Refitment

22. Place the side cover housing in a suitable vice

23. Assemble the resonse lever assembly with side cover housing and hammer using a mallet

24. Turn the side cover housing and place in a suitable vice

25. Assemble the spring on the response cover shaft

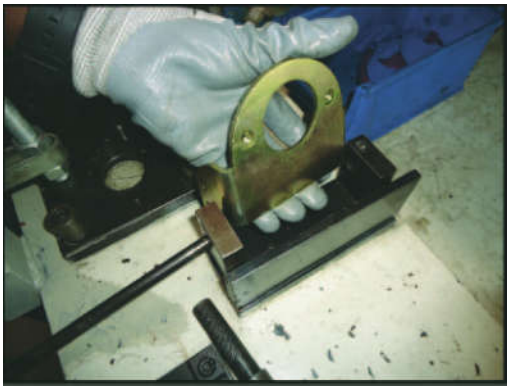
26. Assemble the cam on the response cover shaft

Refitment

27. Align the hole in the cam with hole in response cover shaft by applying little force on the cam

28. secure using a spirol pin

29. Place the pivot plate in a suitable vice and secure it properly



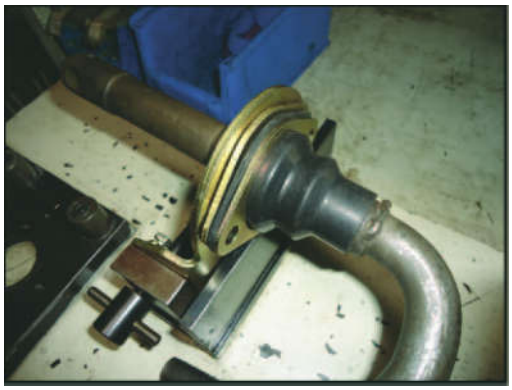
30. Assemble the ball & housing assembly with gear shift lever

Refitment

31. Assemble the gear shift lever with the pivot plate

32. Assemble the rubber boot with the gear shift lever

33. Assemble the clamp plate with gear shift lever



34. Secure the gear shift lever with pivot plate using a retaining ring.

Refitment

35. Secure the gear shift lever assembly with pivot plate using two bolts

36. Align side shift with synchro pivot block and secure using a solid pin

37. secure the solid pin with a hex bolt

38. Place the side cover housing on a suitable vice
39. Apply grease on the side shift shaft
40. Position the side shift shaft assembly with the side cover housing

Refitment

41. Place the side cover housing on a suitable vice

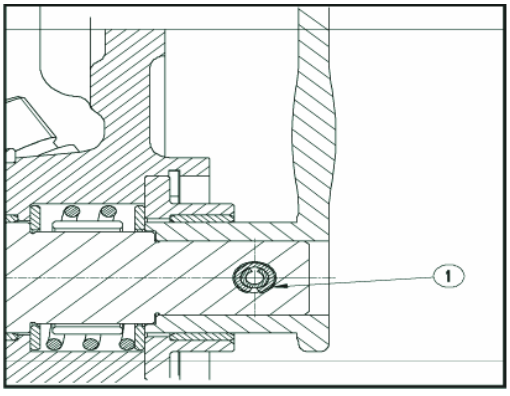
42. On the rear side of the side cover housing, assemble the selector pawl with the side shift shaft

43. Align the holes of selector pawl and side shift housing and secure using a spirol pin

44. Double secure the assembly with another spirol pin which have smaller diameter than the previous.

NOTE: Ends of the both spirol pin should be placed diametrically opposite to each other

45. Spring dowel to be assembled as shown



Refitment

46. Assemble the rubber boot with gear shift lever assembly

47. Secure the assembly using bolt & nut

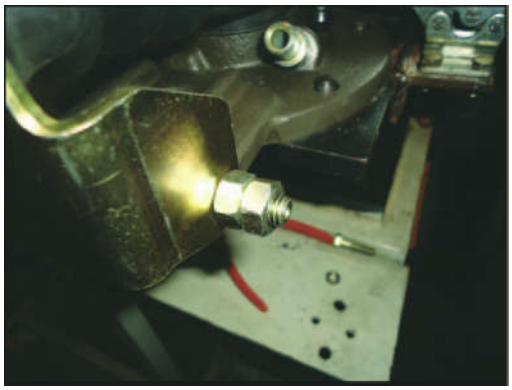
48. Assemble the gear shift assembly with side cover housing assembly by aligning the holes of gear shift lever and synchro block

49. Secure using a solid pin

50. Align the hole of solid pin with gear shift lever and secure using a spirol pin

Refitment

51. Fix the pivot plate with side cover housing using pin assembly
52. Secure with two bolts



53. Secure the rubber boot using a plastic strap
54. Tighten all the fastners

55. Assemble the Side shift sub assembly to the tractor

PLANETARY LEVER (HIGH-LOW GEAR LEVER)

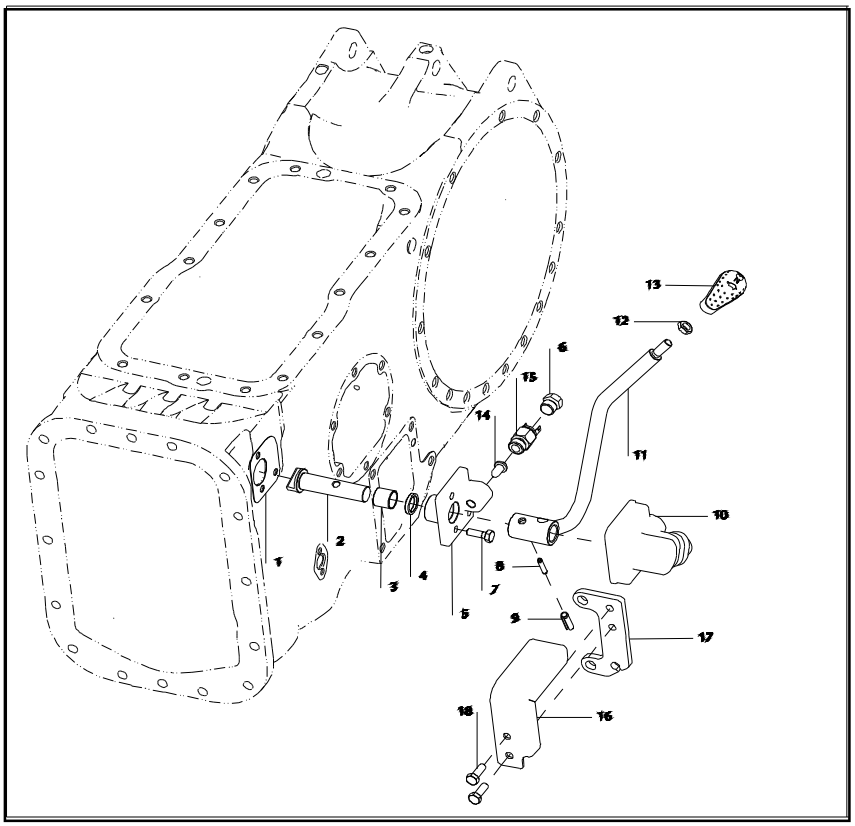


Fig 10

Removal and refitment

Removal

1. Park the vehicle on level ground and apply parking brake.
2. Pull the hood latch cable and lift the hood.
3. Disconnect the battery terminals
4. Remove the LH platform from the tractor, see operation 5.16 Foot step (page 5A - 14) .
5. Ensure planetary lever in neutral position.
6. Remove the knob(13) and nut(12)
7. Disconnect electrical connection from nuetral safety switch.
8. Remove plug(6),
9. Remove the nuetral safety(15) and ejector pin(14)-(FOR 8x2 ONLY)
10. Slightly adjust the rubber boot(10) and remove 3 precoated sealant screw.
11. Remove the planetary lever assembly from centre housing.
12. Remove the boot(10),spring pin(9)(8) and lever(11).
13. Remove the shaft(2),bush(3),oil seal (4) from housing planetary(5).

Refitment

1. Place the planetary housing on the service tool (SER3000007)

NOTE : Refer page no:39 for service tool details

2. Place the bush on the service tool (SER3000007)

NOTE : Refer page no:39 for service tool details

3. Press the bush to the planetary housing using hand press

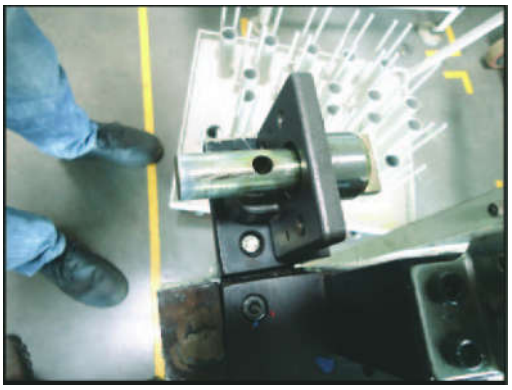
4. Place the seal in the service tool (SER3000007)

NOTE: The lip of seal to be faced upside
Refer page no:39 for service tool details

Refitment

5. Press the seal in the planetary housing using hand press

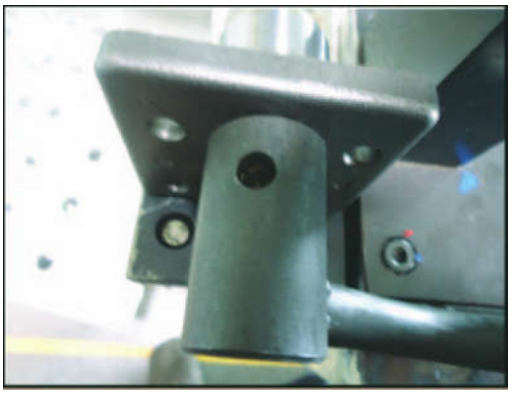
6. Place the planetary lever shaft inside the planetary housing



7. Assemble the planetary shift lever with shaft planetary lever

Refitment

8. Align the hole of planetary shift lever and shaft planetary lever



9. Secure using a spirol pin

10. Assemble the planetary lever sub assembly to the tractor

9A.6 SELECTOR RAILS AND FORKS - CENTER SHIFT

Removal and Refitment

Special Tools:

SER / 054 : Tractor splitting stand

Removal

CAUTION : Beware of the sharp edges around the top of the transmission case.

1. Split the tractor between the centre housing and remove the transmission case.
2. Remove the top cover plate and gasket.
3. Lift out the springs and plungers.
4. Remove the locking wires from the screws.
5. Remove the bolts, balls, pin, stop plate and retainer ball.
6. Remove the locking screw from planetary fork.
7. Remove the planetary fork.
8. Remove the locking screw from shift fork. (Item 5 in Fig. 11).
9. Slide the shift rail rearward out of the transmission and remove the planetary selector.(Item 4 in Fig 11)
10. Remove the screw from 3rd gear fork. (Item 3 in Fig. 11).
11. Remove the screws from shifter fork. (Item 2 in Fig. 11).
12. Slide the rails (1st & R and 2nd & 4th) out of the transmission. (Item 1 in Fig. 11).
13. Rotate the third gear selector rail through 180 deg. (Item 4 in Fig. 12).
14. Remove the selector screw. (Item 1 in Fig. 12).
15. Slide the 3rd gear rail out of the transmission while holding the selector. (Item 3 in Fig. 12).
16. Remove the shifter fork. (Item 2 in Fig. 12).

Refitment

For refitment, follow the reverse procedures given above, and

1. Apply a few drops of oil to the selector rails, plunger and springs before reassembling.

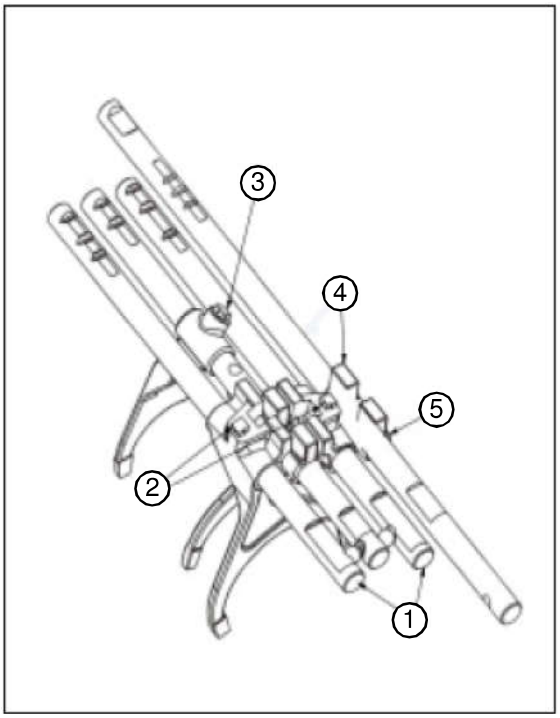


Fig. 11

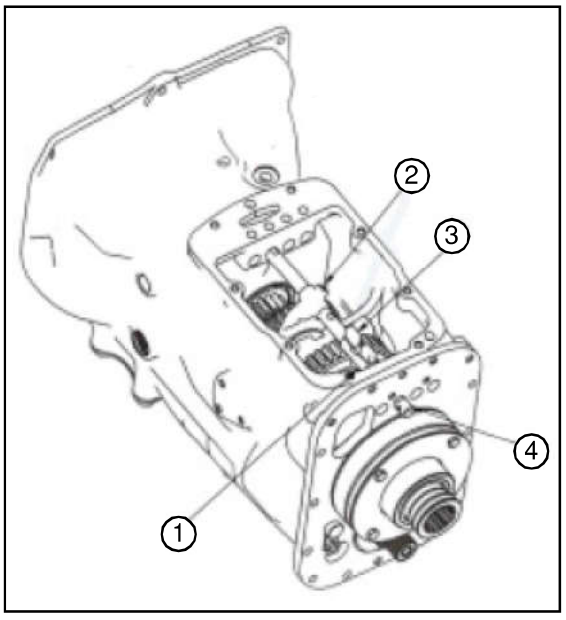


Fig. 12

9A.7 SELECTOR RAILS AND FORKS - SIDE SHIFT

Removal and Refitment

Special Tools:

SER / 054 : Tractor splitting stand

Removal

CAUTION : Beware of the sharp edges around the top of the transmission case.

1. Split the tractor between the centre housing and remove the transmission case.
2. Remove the top cover plate and gasket.
3. Lift out the springs and plungers.
4. Remove the locking wires from the screws.
5. Remove the bolts, balls, pin, stop plate and retainer ball.
6. Remove the locking screw from planetary fork.
7. Remove the planetary fork.
8. Remove the locking screw from shift fork. (Item 5 in Fig. 13).
9. Slide the shift rail rearward out of the transmission and remove the planetary selector.(Item 4 in Fig 13)
10. Remove the screw from 3rd gear fork. (Item 3 in Fig. 13).
11. Remove the screws from shifter fork. (Item 2 in Fig. 13).
12. Slide the rails (1st & R and 2nd & 4th) out of the transmission. (Item 1 in Fig. 13).
13. Rotate the third gear selector rail through 180 deg. (Item 4 in Fig. 14).
14. Remove the selector screw. (Item 1 in Fig. 14).
15. Slide the 3rd gear rail out of the transmission while holding the selector. (Item 3 in Fig. 14).
16. Remove the shifter fork. (Item 2 in Fig. 14).

Refitment

For refitment, follow the reverse procedures given above, and

1. Apply a few drops of oil to the selector rails, plunger and springs before reassembling.

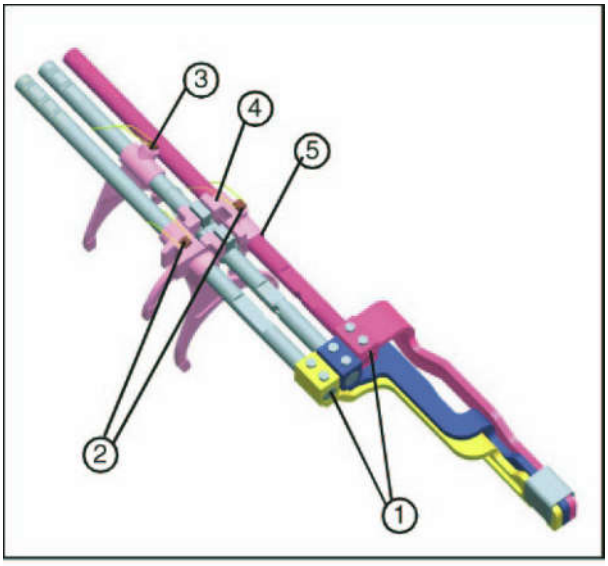


Fig. 13

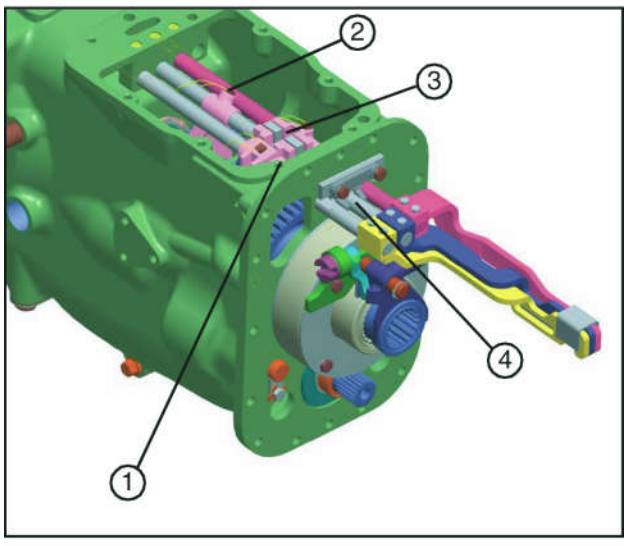


Fig. 14

2. Tighten the ball lock retainer plate bolts to a torque of 32 lbf. ft. (43 Nm).
3. Tighten the shifter fork and selector screws to a torque of 32 lbf.ft (43 Nm.)
4. Use only new wire lock for locking selectors and shifter fork screws.

9A.8 EPICYCLIC UNIT - CENTER SHIFT

Removal and Refitment

Special Tools:

SER / 054 : Tractor splitting stand.

Removal

1. Split the tractor between centre housing and transmission.
2. Remove the planetary fork and coupler (Item 2 in Fig 15).
3. Remove the 4 mounting bolts of ring gear. (Item 1 in Fig 15).
4. Remove the rear cover plate. (Item 3 in Fig 15).
5. Remove epicyclic carrier with rear and front thrust washers. (Item 4 in Fig. 16).
6. Gently tap out the ring gear. (Item 5 in Fig. 16).
7. Remove the front cover plate and shim. (Item 6 in Fig. 16).
8. If necessary, remove the pin dowels from the ring gear. (Item 7 in Fig. 16).

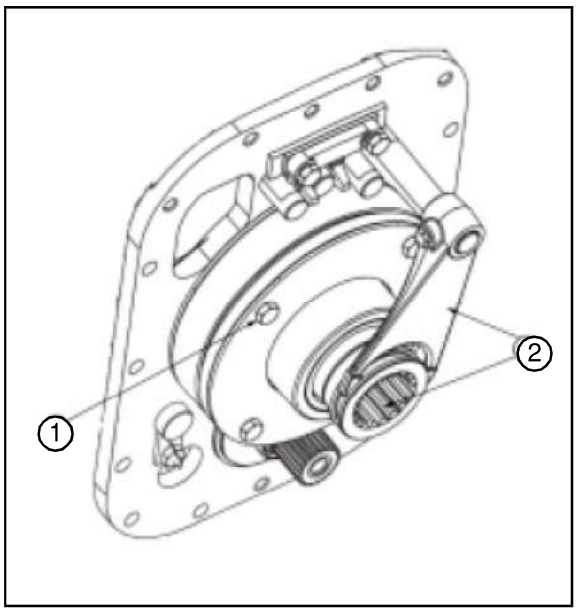


Fig. 15

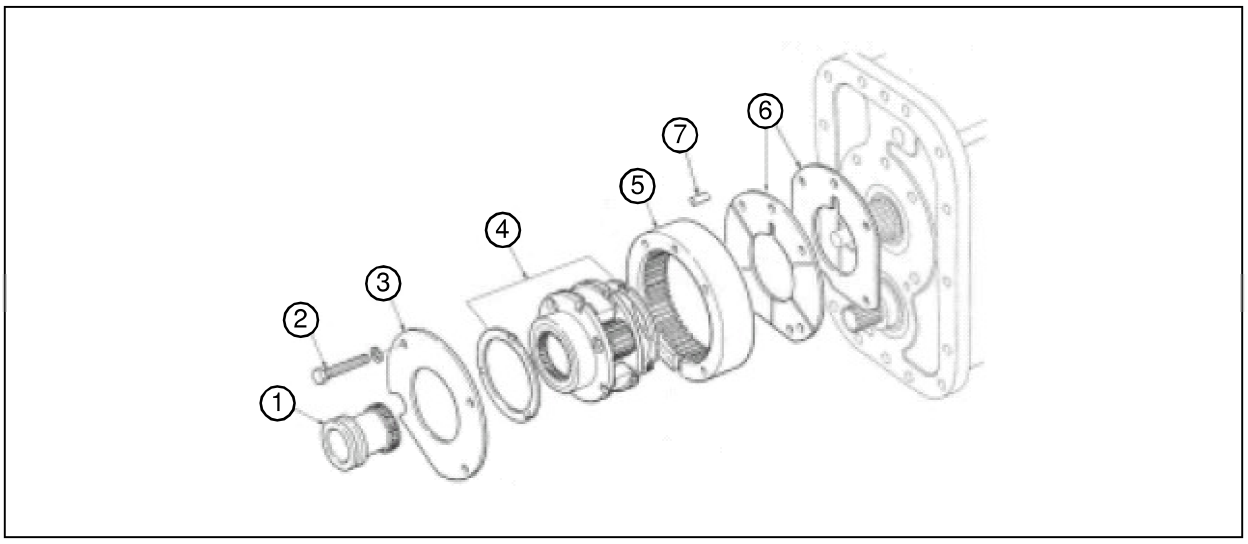


Fig. 16

9A.9 EPICYCLIC UNIT - SIDE SHIFT

Removal and Refitment

Special Tools:

SER / 054 : Tractor splitting stand.

Removal

1. Split the tractor between centre housing and transmission.
2. Remove the 4 mounting bolts of ring gear. (Item 1 in Fig 17).
3. Remove the circlip (Item 23 in Fig. 18).
4. Remove the plunger (Item 21 in Fig. 18), Fork-planetary (Item 22 in Fig. 18), selector shaft planetary (Item 24 in Fig. 18) and Bush HI/LOW (Item 25 in Fig. 18).
5. Remove Selector-planetary (Item 27 in Fig. 18), Slotted pins (Items 28, 29 in Fig. 18).
6. Remove the Assembly bracket planetary (Item 26 in Fig. 18).
7. Remove the rear cover plate. (Item 14 in Fig 18).
8. Remove epicyclic carrier with rear and front thrust washers.

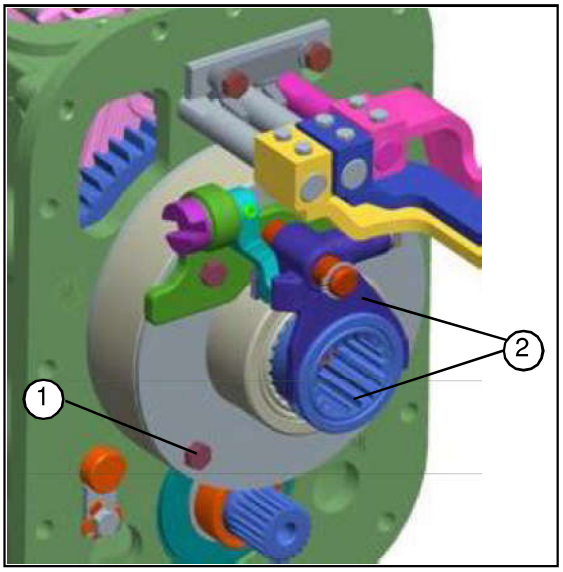


Fig. 17

9. Gently tap out the ring gear. (Item 5 in Fig. 18).
10. Remove the front cover plate and shim. (Item 1,3 in Fig. 18).
11. If necessary, remove the pin dowels from the ring gear. (Item 7 in Fig. 18).

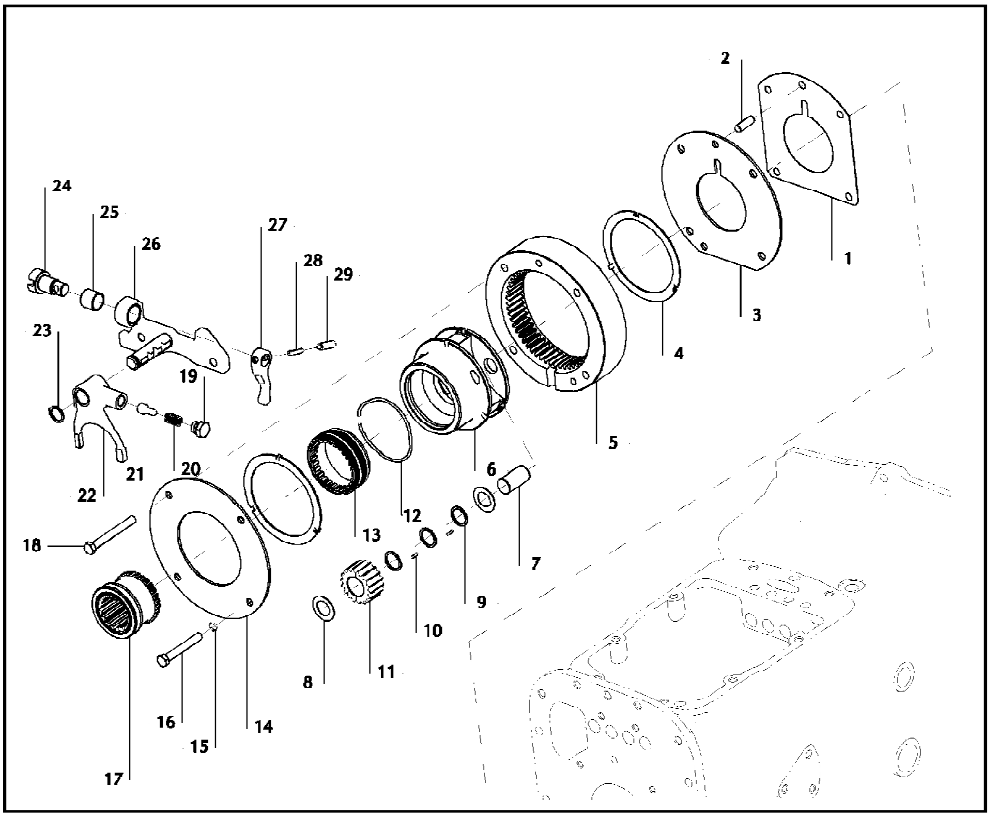


Fig. 18

Examination

Clean and carefully examine all the components, and replace any items that show signs of damage or wear.

Note: *The epicyclic carrier assembly parts cannot be serviced separately, and must be replaced as a complete assembly if found defective.*

Refitment

1. Ensure that the locating dowels are correctly driven in the ring gear.
2. Locate the front plate cover over the ring gear ensuring that the oil grooves face towards the ring gear.
3. Locate the shims over the front plate cover.
4. Position the ring gear with front plate cover and shim on the transmission case ensuring proper seating.
5. Position the two thrust washers on the carrier assembly making sure that the tabs are located in the cutout on carrier assembly. To facilitate fitment of the front and rear thrust washers on the carrier assembly, smear with petroleum jelly (not grease).
6. Insert the carrier assembly with thrust washer into the ring gear and main shaft.
7. Locate the rear cover plate over the carrier assembly making sure oil groove is facing carrier assembly.
8. Do not fit a lock washer to the lower left hand retaining bolt.
9. Refit the mounting bolts and tighten the bolts to a torque of 35 lbf.ft. (47 Nm).

9A.10 CLUTCH RELEASE MECHANISM

Removal and Refitment

Special Tools:

SER / 054 : Tractor splitting stand.

SER / 038 : Hand press tool

Removal and Dis-assembly

1. Split the tractor between the engine and the transmission.
2. Remove the clutch release bearing return spring. (Item 1 in Fig. 19).
3. Slide out the clutch carrier with release bearing from the retainer main drive housing. (Item 2 in Fig. 19).

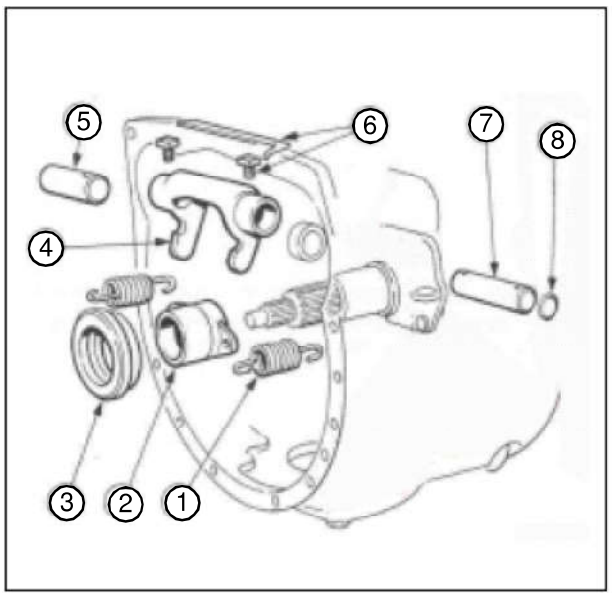


Fig. 19

4. Remove the locking wire and the two locking screws from the clutch release fork. (Item 6 in Fig. 19).
5. Slide out the left - hand clutch pedal pivot shaft with the release arm from the transmission housing.(Item 7 in Fig 19).
6. Remove the right - hand clutch pedal shaft plug.
7. Slide out the right - hand clutch pedal pivot shaft from the transmission housing. (Item 5 in Fig 19).
8. Remove the clutch release fork. (Item 4 in Fig. 19).
9. Remove the bearing from the carrier. (Item 3 in Fig. 19) by using SER / 038 Hand press tool.

Examination

Clean and carefully examine all the components, and replace any item that show signs of damage/wear.

Re-assembly and Refitment

For reassembling and refitment, follow the reverse procedures given above, and

1. Install the clutch pedal shaft with a new 'O' ring. (Item 8 in Fig. 19).
2. Install clutch pivot shaft plug .
3. Use new wire lock for locking screws.
4. Lightly smear grease on both input shaft splines and the release bearing carrier bore.
5. Check the free sliding of the carrier assembly over the retainer main drive housing.

9A.11 MAIN DRIVE HOUSING AND PTO PINION SHAFT

Removal and Refitment

Special Tools:

SER / 054	:	Tractor splitting stand.
SER / 038	:	Hand Press Tool
SER / 076	:	Input shaft oil seal replacer.
SER / 075	:	Housing Main drive needle bearing remover and replacer.
SER / 036	:	PTO Pinion oil seal replacer.
SER / 099	:	Oil seal replacer.
SER / 056	:	Adaptor for multipurpose bearing remover / replacer.

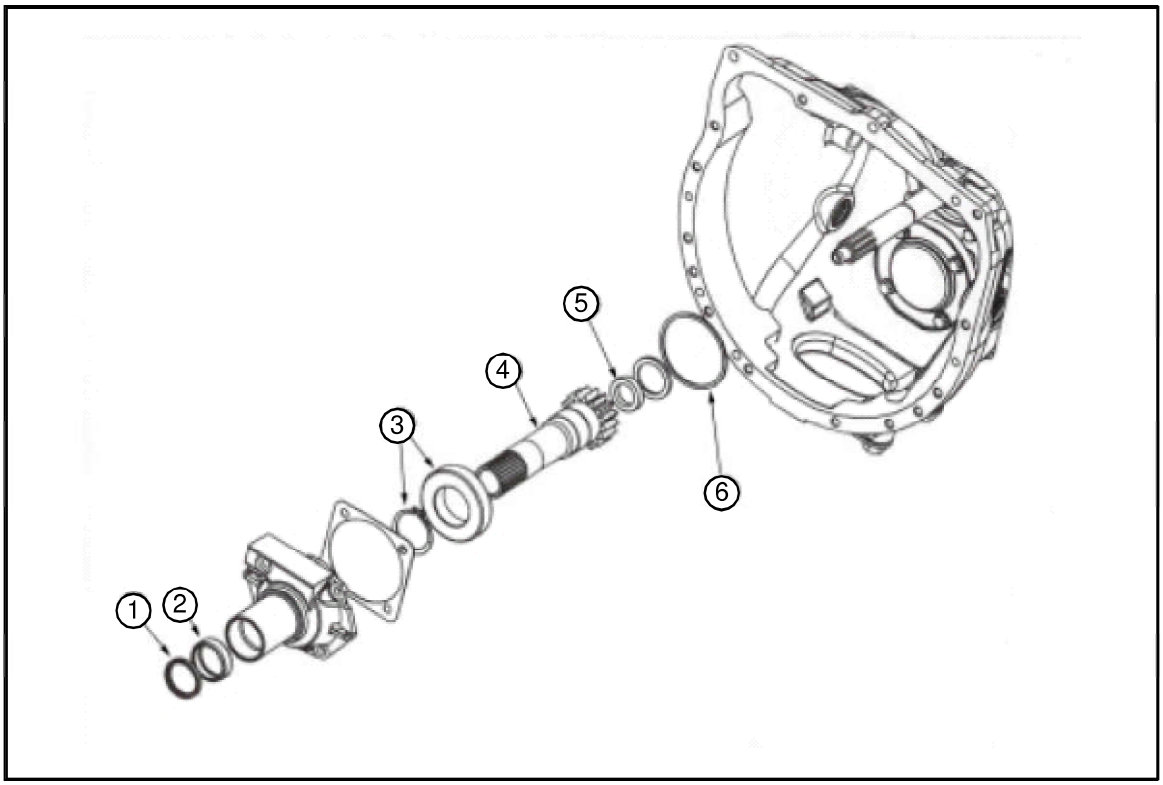


Fig. 20

Removal and Disassembly

1. Remove the clutch release mechanism.
2. Loosen and remove the main drive retainer bolts
3. Remove the main drive retainer housing with PTO pinion shaft and gasket.
4. Remove the PTO pinion shaft retaining ring. (Item 6 in Fig. 20).
5. Push the PTO pinion shaft complete with bearing out of the housing.
6. If necessary remove the circlip and press the bearing off the Shaft. (Item 3 in Fig. 20) by using SER / 038 hand press tool.
7. Remove the PTO pinion shaft oil seal. (Item 5 in Fig. 20).
8. Remove the oil seal from main drive housing (Item 1 in Fig. 20).
9. Remove the needle roller bearing by using SER / 075 (Item 2 in Fig. 20).

Reassembly and Refitment

1. Install the needle roller bearing into the housing by using SER / 075 (Item 2 in Fig. 20).
2. Fit a new oil seal into the housing by using SER / 036 and seal lip facing away from the tool. (Item 1 in Fig. 20).
3. Fit a new oil seal in the PTO pinion shaft with lip of the seal facing the tool by using SER / 076 (Item 5 in Fig. 20).
4. Refit the PTO pinion shaft bearing onto the PTO pinion shaft and refit the circlip, and check that it is properly seated. (Item 3 in Fig. 20).
5. Refit the PTO pinion shaft into the main drive housing.
6. Refit the circlip (Item 6 in Fig. 20) and check that it is properly seated.
7. Smear petroleum jelly to lubricate oil seals lips.
8. Insert the main drive retainer housing with new gasket and PTO pinion shaft into the Input shaft.
9. Replace the housing bolts (pre coated) and tighten the bolts to a torque of 45 lbf. ft. (61 Nm).

9A.12 PTO DRIVE SHAFT BEARING HOUSING

Removal and Refitment

Special Tools:

SER / 054 : Tractor splitting stand.

SER / 038 : Hand Press Tool

Removal

1. Split the tractor between the engine and the transmission.
2. Remove the brake cross shaft.
3. Remove the bolts from the front PTO bearing cover. (Item 1 in Fig 21).
4. Remove front PTO bearing cover with gasket. (Item 3 & 5 in Fig 23).
5. Remove the external ring retainer and washer. (Item 2 in Fig. 23) .
6. Screw two 3/8 UNC X 75 mm (3") bolts into the bearing housing tapped holes and tighten them evenly to pull out the housing from the transmission case and PTO shaft. (Fig. 22).
7. Remove the ring retainer. (Item 6 in Fig. 23).
8. Press out the bearing. (Item 7 in Fig. 23) by using SER / 038 hand press tool. (Used in conjunction with SER / 056).
9. Remove and discard the gasket. (Item 8 in Fig. 23).

Note: *PTO shaft can only be removed from the rear side of the transmission case. The PTO constant mesh gears can then be lifted out through the top opening of the housing.*

Refitment

1. Refit the bearing into the housing.
2. Refit the ring retainer. Renew if necessary and ensure proper seating in groove.
3. Assemble the constant mesh PTO gears and ensure proper location on the PTO drive shaft.
4. Apply a light coat of recommended sealant over the gasket (Item 8 in Fig. 23)
5. Refit the front PTO housing with bearing onto the PTO drive shaft.
6. Fit a new ring retainer and washer.

For reassembling and fitment follow the reverse procedures of removal.

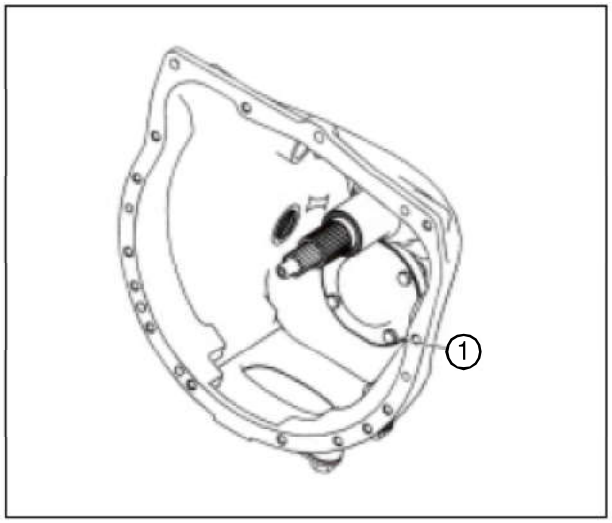


Fig. 21

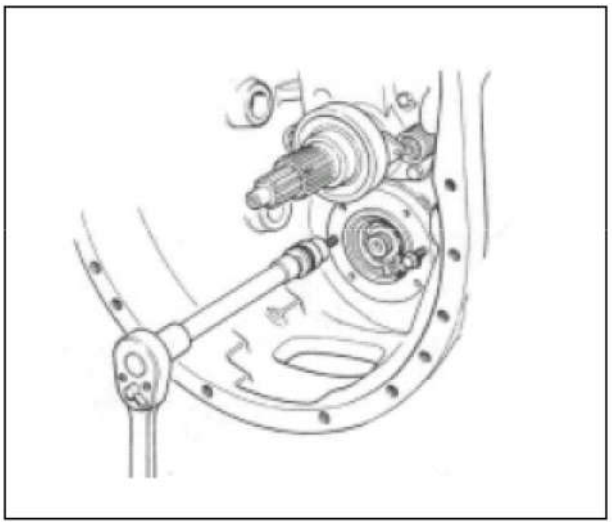


Fig. 22

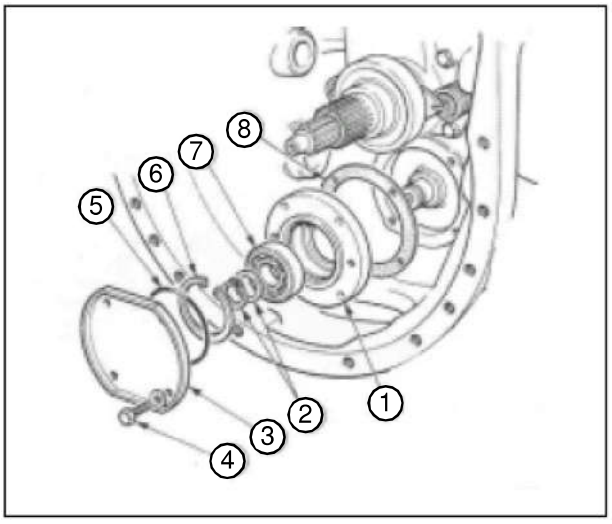


Fig. 23

7. Apply a light coat of recommended sealant to the gasket (Item 5 in Fig. 22) before fitting the front PTO cover with new pre coated bolts.
8. Tighten the bolts to a torque of 45 lbf. ft. (61 Nm).

9A.13 MAIN SHAFT, COUNTER SHAFT AND GEARS

Removal and Dis-assembly

Special Tools:

SER / 054 : Tractor splitting stand.

SER / 036 : Hand Press Tool

SER / 087 : Centralizer

1. Remove the transmission case from the tractor using tractor splitting stand.
2. Remove the selector rails, forks and selectors.
3. Remove the epicyclic unit.
4. Remove the clutch release carrier and release fork.
5. Remove the main drive housing retainer with PTO pinion shaft.
6. Remove the brake cross shaft.
7. Remove the cover and PTO bearing housing.
8. Remove the PTO drive shaft and PTO constant mesh gears.

Input Shaft

1. Remove the input shaft with thrust washers (Item 1 in Fig. 24).
2. Remove the spacer and bearing of the input shaft from the main shaft (Item 2 in Fig. 24).

Main Shaft

1. Remove the 3rd Gear from main shaft. (Item 10 in Fig. 25).

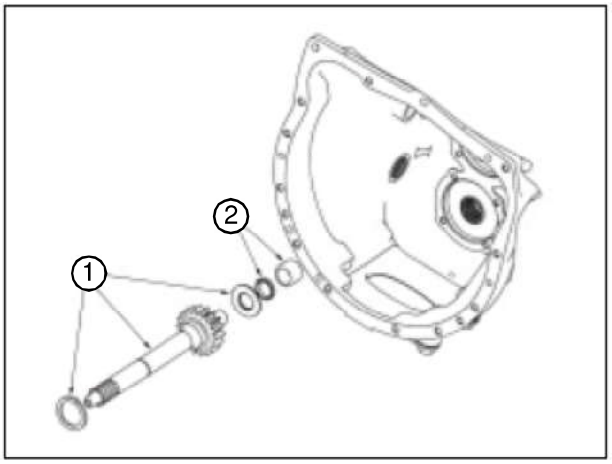


Fig. 24

2. Remove the front snap ring. (Item 9 in Fig. 25).
3. Drive the main shaft rearwards out of the front Bearing. (Item 8 in Fig. 25).
4. Remove the rear Snap ring. (Item 7 in Fig. 25).
5. Withdraw the main shaft rearwards lifting out the low speed,intermediate & high gears. (Item 5 and 6 in Fig. 25).
6. Slide out the main shaft with bearing from rear side of the transmission Case. (Item 1 in Fig. 25).
7. Remove the front and rear snap rings. (Item 2 and 4 in Fig. 25).
8. Remove the ball bearing. (Item 3 in Fig. 25) by using SER / 038 hand press tool.

Counter Shaft

1. Remove the snap ring from the front of the counter shaft. (Item 10 in Fig. 26).
2. Remove the snap ring from the rear of the counter shaft (Item 1 in fig 26)

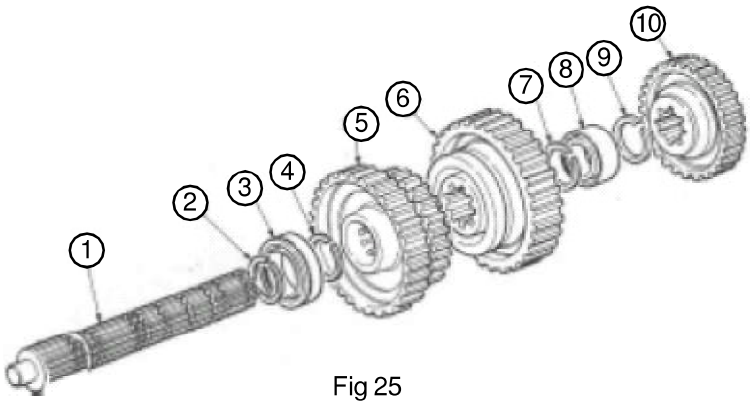


Fig 25

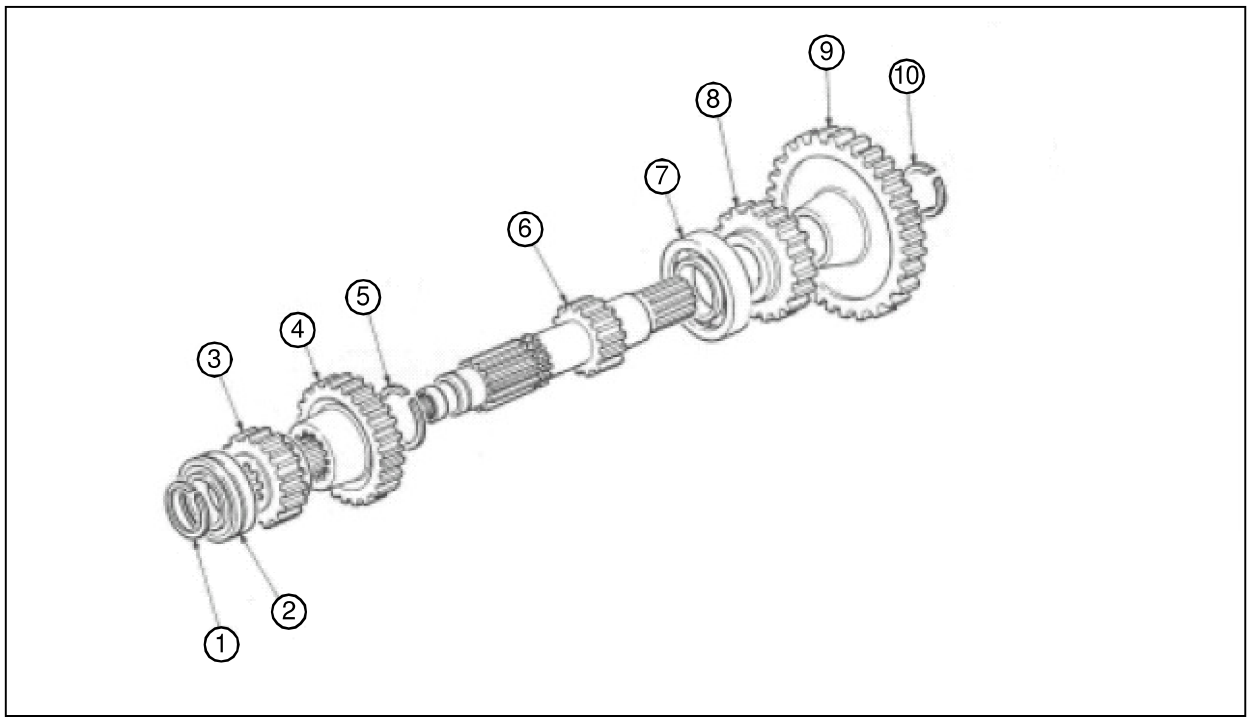


Fig. 26

3. Tap the shaft rearwards and remove the constant mesh gear (Item 9 in Fig. 26) and remove the pinion counter shaft 3rd gear. (Item 8 in Fig. 26).
4. Withdraw the counter shaft forward and remove the pinion intermediate gear and pinion high gear. (Item 3 and 4 in Fig. 26).
5. Slide out the counter shaft from front side of the transmission case. (Item 6 in Fig. 26).
6. Remove the front counter shaft bearing. (Item 7 in Fig. 26) by using SER / 038 Hand press tool.
7. Remove the counter shaft intermediate snap ring if necessary. (Item 5 in Fig. 26).
8. Remove the rear counter shaft bearing from transmission case (Item 2 in Fig. 26).

Reverse Gear Cluster

Note : (see Fig. 27)

1. Release the locking tab-washer. (Item 1 in Fig. 27).
2. Remove the bolt and stop plate. (Item 2 in Fig. 27).
3. Slide the dummy shaft rearwards from the front of the reverse gear shaft. This will push out the shaft reverse cluster and prevent the needle rollers from dropping into the transmission case.
4. Remove the reverse gear cluster (Item 3 in Fig 27) complete with needle rollers, spacer, washers, thrust washers and dummy shaft.
5. Remove the dummy shaft from the reverse gear cluster and release the needle rollers, spacer, washers and thrust washers into a clean tray.

Examination

Clean and carefully examine all the components, especially those subject to movement, and replace any items that show signs of damage or wear.

Note : *Use SER / 087 for reverse gear cluster needle bearing fitment.*

Re-assembly

Note: *All snap rings must be renewed, ensuring that snap rings are correctly located in their groove.*

Reverse Gear Cluster

1. Refit the spacer in the reverse gear cluster. (Item 4 in Fig. 27).
2. Lightly pack the inside of the reverse gear cluster with petroleum jelly.
3. Refit the first set of 28 rollers. (Item 5 in Fig. 27).
4. Refit the washer. (Item 6 in Fig. 27).

5. Refit the second set of 28 rollers. (Item 5 in Fig. 27).
6. Refit the washer. (Item 6 in Fig. 27).
7. Refit the thrust washers on both side of the reverse gear cluster. (Item 7 in Fig. 27).
8. Refit the reverse cluster assembly with thrust washers in transmission case and slide the reverse gear cluster shaft into the transmission case. Ensure that the thrust washers and needle bearings are not dislodged.
9. Position the washer-spacer into the rear of the reverse gear cluster. (Item 8 in Fig. 27).
10. Locate the stop plate and fit a new lock tab-washer to lock the bolt and tighten the bolt to torque.

Counter Shaft

For reassembling, follow reverse procedures of counter shaft removal .

Main Shaft

For reassembling, follow reverse procedures of Main Shaft removal .

Input Shaft

For reassembling, follow reverse procedures of Input shaft removal and ensure that the thrust washer is fitted with the oil groove facing the main shaft.

For reassembling the rest of the transmission, follow the reverse procedure of removal and dis-assembly 1 to 8 of operation No. 9A. 13

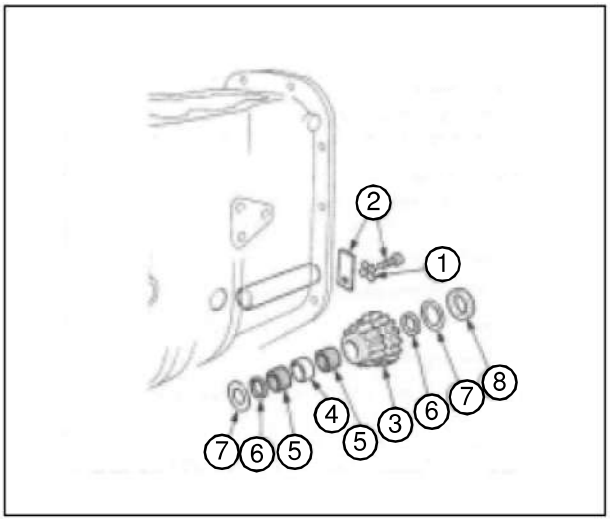


Fig. 27

9A.14 - SIDE SHIFT - SERVICE TOOL DETAILS

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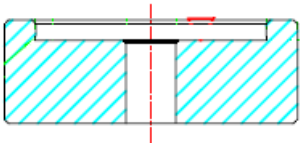
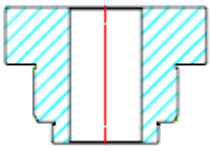
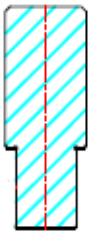
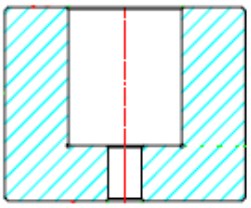
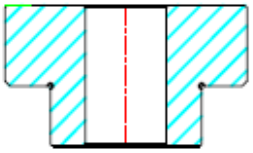
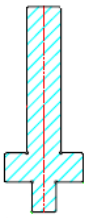
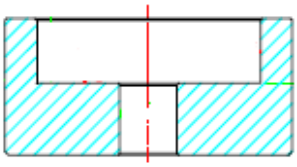
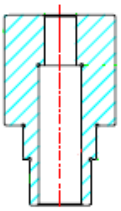
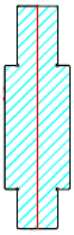
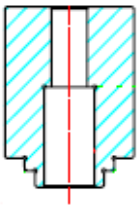
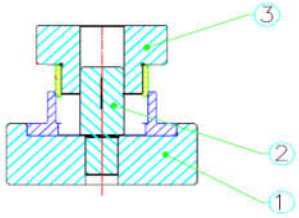
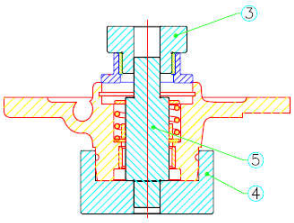
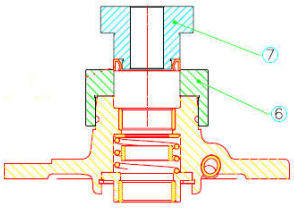
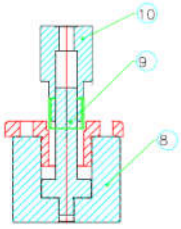
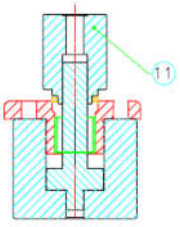
1		Locator	7		Pusher
2		Guide	8		Locator
3		Pusher	9		Guide
4		Locator	10		Pusher
5		Guide	11		Pusher
6		Locator			

9A.14 - SIDE SHIFT - SERVICE TOOL DETAILS

SERVICE TOOL NUMBER	DESCRIPTION	IMAGE	REMARKS
SER3000007	Pressing tool (Bush to collar)		1- Locator 2- Guide 3- Pusher
	Guiding tool (SS housing)		4- Guide 5- Locator
	Pressing tool (Seal into SS housing)		6- Locator 7- Pusher
	Pressing tool (Bush into Planetary hsg.)		8- Locator 9- Guide 10- Pusher
	Pusher		11- Pusher

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